Key results for the Global Carbon Budget 2016

EMBARGO:
00.01 GMT (London time) on MONDAY 14 NOVEMBER 2016
00.01 WET (West European time – Marrakesh) on MONDAY 14 NOVEMBER 2016
19.01 US EST on SUNDAY 13 NOVEMBER 2016

1. Global carbon emissions are nearly flat for third year in a row.
   - CO₂ emissions from fossil fuels and industry did not grow in 2015, at 36.3 GtCO₂, and are projected to rise only slightly in 2016 by 0.2% (range of -1.0 to + 1.8%), with world-average emissions per person at 4.8 tCO₂ for 2016 (see further statistics in Table 1 below).
   - This is the third year in a row with global emissions below 1% growth while global GDP exceeds 3% growth. It marks a clear and unpredicted break with the rapid emissions growth of 2.3% per year of the previous decade (2004-2013), and 0.7% growth in 2014.
   - In 2015 and 2016, the key changes are
     - China’s decreased coal use again largely accounts for the break in global emissions growth, with Chinese emissions decreasing -0.7% in 2015. Emissions in China are projected to decrease for a second year, by -0.5% in 2016 (range of -3.8 to +1.3%). In comparison, China’s emission grew by 5.3% per year during 2005-2014. Considerable uncertainty is associated with 2016 estimates of China’s national emissions, due to uncertain data on stocks of coal and oil, and in reporting of emissions particularly by small coal mines. Emissions for China reported here are based on the most recent data revisions.
     - US emissions decreased, by -2.6% in 2015, with coal decreasing and oil and gas increasing. US emissions are projected to decrease by -1.7 in 2016 (range of -4.0 to +0.6).
     - Indian emissions increased +5.2% in 2015 (no projection for 2016). This growth is similar to the average growth of 6.4% per year on average during 2005-2014.
     - Emissions from deforestation and other land-use change were estimated at 4.8 GtCO₂ in 2015 (range of 3.0-6.6). This is 1.0 GtCO₂ above the average of the previous decade because of fires in Indonesia related to land-use change and exacerbated by El Niño conditions, as detected from satellite. (Details available at http://www.globalfiredata.org/updates.html).
     - We do not yet have land-use change emissions for 2016, but fire activity related to land management so far (January to August) suggest a return to average or below average conditions.

2. With three years of reduced growth in emissions it is possible that the trajectory of global emissions has permanently deviated from the long-term rapid growth trend.
   - The three years of reduced growth in global emissions primarily relates to a marked slowdown in coal consumption in China. Emissions growth in the next few years will depend on whether energy and climate policies can lock in the slowdown in emissions growth, and
importantly, raise the ambition of emission pledges to be more consistent with the
temperature goals of the Paris Agreement.

- The marked 3-year break in the rise in global emissions is aligned with the country pledges
  (NDCs) but not with the climate objectives of the Paris Agreement.
    - The lower growth in emissions is consistent with the collective NDCs emission
      pledges with projected emissions from fossil fuels and industry in the range 37-43
      GtCO₂ per year in 2030, or 0.7% per year growth to 2030 for the conditional pledges
      (range 0.1 to 0.9% per year) and 1.0% per year growth for the unconditional pledges
      (range 0.5 to 1.3% per year).
    - The lower growth in emissions is not aligned with the pathways that limit climate
      change below two degrees Celsius, which require emissions to decrease by -0.9% per
      year (range -2.4 to -0.6 % per year) to 2030.

3. Record growth in atmospheric CO₂ in spite of flat emissions due to weak carbon sinks

- In spite of a nearly flat growth in emissions, the growth in atmospheric CO₂ concentration
  was a record-high in 2015 and could be a record high again in 2016, at 23 and 25 GtCO₂
  respectively, compared to 16 GtCO₂ per year in the previous decade. The high growth in
  atmospheric CO₂ was caused by smaller sinks of carbon in the terrestrial biosphere in
  response to warm and dry conditions over tropical land caused by the recent El Niño event
  that lasted from May 2015 to June 2016.
- In 2015, the ocean sink was near or slightly above its decadal average at 11 [9 to 13] GtCO₂.
  The land sink was smaller than usual at 7 [4 to 10] GtCO₂, only 60% of its intensity for the
  previous decade.
- Atmospheric CO₂ levels have exceeded 400 parts per million (ppm) in 2015, 44% above pre-
  industrial levels [data NOAA/ESRL]. This is the highest level in at least the last 800,000 years.
- Verification of reported emissions cannot yet be done with independent data because of
  uncertainties in our capacity to account for carbon fluxes in the natural environment. This
  uncertainty is about 5 GtCO₂ per year over a period of 5 years. The implication is that, at the
  moment, it could take 5-10 years before a peak in global CO₂ emissions is confirmed with
  independent data.

4. The remaining carbon quota that we can emit to limit climate change below two degrees Celsius
   has shrunk further

- Global emissions need to decrease to near zero to stop the rise in atmospheric CO₂ and
  achieve climate stabilisation (at any level). This implies that there is a fixed cumulative
  carbon quota available to keep global average temperature below a desired stabilisation
  level.
- Cumulative emissions from year 1870 to year 2016 are 2075 [1870 to 2280] GtCO₂ including
  emissions from fossil fuels, industry, and land use change.
- The remaining carbon quota to stay well below two degree Celsius has shrunk another 40
  GtCO₂ in 2016 due to ongoing emissions. We have already used more than two thirds of the
  emissions quota to keep climate change well below two degrees. The remaining quota
would be used up in less than 30 years at the current emission level, and even less to keep the warming to 1.5 degree Celsius.

5. Access to Data and Forums
   - Data pertaining to the Global Carbon Budget 2016 can be accessed from http://www.globalcarbonproject.org/carbonbudget and http://dx.doi.org/10.3334/CDIAC/GCP_2016
   - Global and national data on carbon emissions from fossil fuels and industry to year 2015 can also be obtained from the Global Carbon Atlas, an online interactive tool to explore, plot and download data http://globalcarbonatlas.org
   - Full publication including methods http://www.earth-syst-sci-data.net/8/605/2016/
   - Social Media:
     - https://www.facebook.com/globalcarbonproject
     - https://twitter.com/gcarbonproject
     - #carbonbudget
     - Global Carbon Budget, @gcarbonproject
     - Glen Peters, @Peters_Glen
     - Pep Canadell, @pepcanadell
     - Tyndall Centre for Climate Change Research, @TyndallCentre
     - Future Earth, @futureearth
     - Corinne Le Quéré, @clequere

Table 1. 2015 fossil fuel emissions from top 20 countries including the EU (together and separate) in billion tonnes CO₂/yr.

<table>
<thead>
<tr>
<th>Country</th>
<th>2015 fossil fuel emissions (billion tonnes CO₂/yr)</th>
<th>2015 percent of total (excluding bunker)</th>
<th>2015 emissions per capita (tonnes CO₂/person/yr)</th>
<th>Growth rate 2014-2015 (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>10.4</td>
<td>29%</td>
<td>7.5</td>
<td>-0.7</td>
</tr>
<tr>
<td>USA</td>
<td>5.4</td>
<td>15%</td>
<td>16.8</td>
<td>-2.6</td>
</tr>
<tr>
<td>EU28</td>
<td>3.5</td>
<td>10%</td>
<td>7.0</td>
<td>1.4</td>
</tr>
<tr>
<td>India</td>
<td>2.3</td>
<td>6%</td>
<td>1.7</td>
<td>5.2</td>
</tr>
<tr>
<td>Russia</td>
<td>1.6</td>
<td>4%</td>
<td>11.3</td>
<td>-3.3</td>
</tr>
<tr>
<td>Japan</td>
<td>1.2</td>
<td>3%</td>
<td>9.8</td>
<td>-2.2</td>
</tr>
<tr>
<td>Bunkers</td>
<td>1.1</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>0.80</td>
<td>2%</td>
<td>9.9</td>
<td>0.7</td>
</tr>
<tr>
<td>Iran</td>
<td>0.65</td>
<td>2%</td>
<td>8.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>0.60</td>
<td>2%</td>
<td>19.0</td>
<td>5.5</td>
</tr>
<tr>
<td>South Korea</td>
<td>0.59</td>
<td>2%</td>
<td>11.8</td>
<td>0.2</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.54</td>
<td>1%</td>
<td>2.1</td>
<td>3.5</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.51</td>
<td>1%</td>
<td>2.5</td>
<td>-2.3</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.47</td>
<td>1%</td>
<td>3.7</td>
<td>-1.8</td>
</tr>
<tr>
<td>Country</td>
<td>CO₂ Emissions (Gt)</td>
<td>CO₂ Growth Rate (%)</td>
<td>CO₂ Emissions (ppm)</td>
<td>CO₂ Growth Rate (ppm)</td>
</tr>
<tr>
<td>------------</td>
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<td>---------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Canada</td>
<td>0.46</td>
<td>1%</td>
<td>12.9</td>
<td>-3.0</td>
</tr>
<tr>
<td>South Africa</td>
<td>0.46</td>
<td>1%</td>
<td>8.5</td>
<td>-3.8</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.42</td>
<td>1%</td>
<td>6.4</td>
<td>-4.1</td>
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<td>Australia</td>
<td>0.40</td>
<td>1%</td>
<td>16.7</td>
<td>1.7</td>
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<tr>
<td>Turkey</td>
<td>0.39</td>
<td>1%</td>
<td>4.9</td>
<td>1.1</td>
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<td>Italy</td>
<td>0.36</td>
<td>1%</td>
<td>6.0</td>
<td>5.4</td>
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<tr>
<td>France</td>
<td>0.34</td>
<td>1%</td>
<td>5.3</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Global total (inc bunkers) 36.3 4.9 0.06

Results presented here will be published on November 14, 12.01 GMT, in:


This media release is part of the Global Carbon Budget 2016, the annual update by the Global Carbon Project. It is based on the analyses published here:

Access:
- Data and figures: [http://www.globalcarbonproject.org/carbonbudget](http://www.globalcarbonproject.org/carbonbudget)
- Data interface for exploring data: [http://www.globalcarbonatlas.org](http://www.globalcarbonatlas.org)
- Prior to embargo: ESSD paper and Infographics can be requested for media purposes to press@uea.ac.uk
- After embargo: ESSD paper is open access available at link above

Social media:
- Facebook [https://www.facebook.com/globalcarbonproject](https://www.facebook.com/globalcarbonproject)
- Twitter: @gcarbonproject

Funding:
- Contributors to the Global Carbon Budget 2016 are funded by research organisations and government departments in multiple countries and supported by their organisations.
● The Global Carbon Atlas that provides easy access to the emissions data is funded by the BNP Paribas Climate Philanthropy
● A full list of funders is provided in Table B1 of the ESSD paper